PV Inverter

SUNNY MINI CENTRAL 9000TL/10000TL/11000TL 9000TL/10000TL/11000TL with Reactive Power Control

User Manual

SMC9-11TLRP-BA-BEN111320 | TBEN-SMC9-11TL | Version 2.0

EN

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1 Information on this Manual

1.1 Validity

This manual applies to the following device types:

- Sunny Mini Central 9000TL (SMC 9000TL-10)
- Sunny Mini Central 10000TL (SMC 10000TL-10)
- Sunny Mini Central 11000TL (SMC 11000TL-10)
- Sunny Mini Central 9000TL with Reactive Power Control (SMC 9000TLRP-10)
- Sunny Mini Central 10000TL with Reactive Power Control (SMC 10000TLRP-10)
- Sunny Mini Central 11000TL with Reactive Power Control (SMC 11000TLRP-10)

1.2 Target Group

This manual is for the operator.

1.3 Additional Information

You will find additional information on the device-specific technical data in the installation guide provided.

You will find additional information on special subjects (e.g. description of the operating parameters) in the download area at www.SMA.de/en.

1.4 Symbols Used

The following types of safety instructions and general information are used in this manual:

DANGER!

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING!

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION!

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE!

NOTICE indicates a situation that can result in property damage if not avoided.

Information

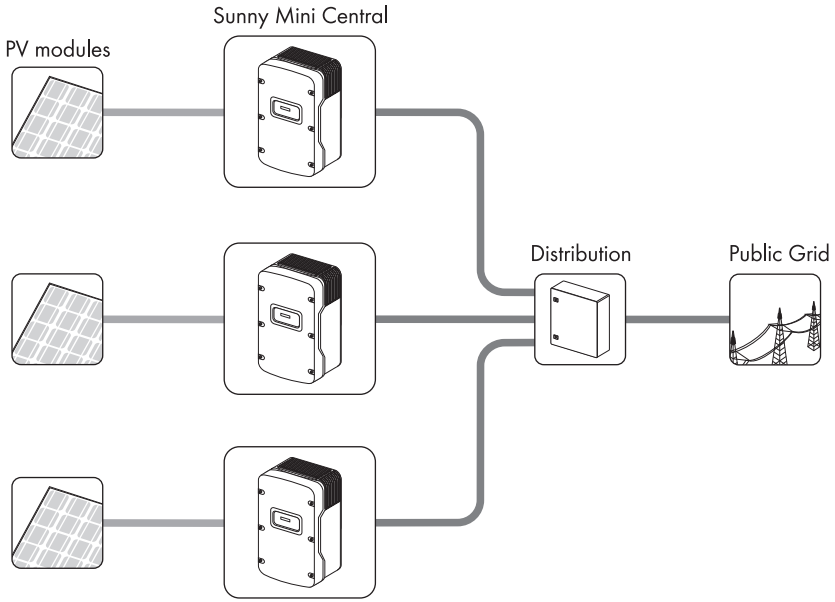
Information provides tips that are valuable for the optimal installation and operation of your product.

2 Safety

2.1 Appropriate Usage

The Sunny Mini Central is a PV inverter, which converts the direct current of the PV array to alternating current and feeds it into the power distribution grid.

Operating Principle of a PV Plant with Sunny Mini Central



The Sunny Mini Central may only be operated with PV arrays (modules and cabling) of protection class II. Do not connect any sources of energy other than PV modules to the Sunny Mini Central.

Do not use the Sunny Mini Central for purposes other than those described here. Alternative uses, modifications to the Sunny Mini Central or the installation of components not expressly recommended or sold by SMA Solar Technology AG void the warranty claims and operation permission. Contact the SMA Serviceline if you need clarification regarding proper use of the inverter.

This manual is a part of the Sunny Mini Central. Observe all of the activities described in this manual. Keep this manual in a convenient place for future reference.

2.2 Safety Instructions

DANGER!

Electric shock caused by high voltage in the inverter.

Even when no external voltage is present, there can still be high voltages in the device.

- Electrical installation, repairs and modification may be carried out by qualified personnel only.
- The appliance is not to be used by children or persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have beengiven supervision or instruction.
- Children should be supervised to ensure that they do not play with the appliance.

CAUTION!

Danger of burn injury due to hot enclosure parts.

- Only touch the lid and display during operation.

NOTICE!

Damage to the inverter through overvoltage, if the yellow LED flashes 4 times.

- Inform your installer immediately if the yellow LED flashes and the inverter shows the display message "!PV-Overvoltage! !DISCONNECT DC!".

2.3 Explanation of Symbols

2.3.1 Symbols on the Inverter

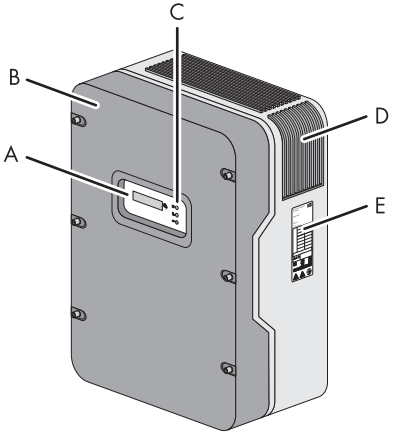
Symbol	Explanation
	Operation display.
	Ground fault or varistor defective. Inform your installer.
	An error has occurred. Inform your installer **immediately**.
	You can operate the display by tapping. Tap once: The background illumination switches on or the display scrolls one message further.

2.3.2 Symbols on the Type Label

Symbol	Explanation
	Beware of dangerous electrical voltage. The inverter operates at high voltages. All work on the inverter may only be carried out by electrically skilled persons.
	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.
	Observe all documentation that accompanies the inverter.
	The inverter must not be disposed of together with household waste. Further disposal information can be found in the installation guide provided.
CE	CE mark. The inverter complies with the requirements of the applicable EC guidelines.

Symbol	Explanation
	The inverter is transformerless.
	Direct current (DC).
	Alternating current (AC).
	Degree of protection IP65. The inverter is protected against penetration by dust particles and water jets from any angle.
	RAL quality mark for solar products. The inverter complies with the requirements of the German Institute for Quality Assurance and Labeling.
	Australian mark of conformity. The inverter complies with the requirements of the applicable Australian guidelines.
	Korean mark of conformity. The inverter complies with the requirements of the applicable Korean guidelines.
	Chinese mark of conformity. The inverter complies with the requirements of the applicable Chinese guidelines.

3 Product Overview



Position	Description
A	Display
B	Lid
C	LEDs Green LED = Operation Red LED = ground fault; varistor defective or string fuse defective Yellow LED = Fault
D	Fan screen
E	Type label for the identification of the inverter via the serial number (Serial No.).

4 Display

4.1 Operation

The display shows the current values of your plant. The displayed values are updated every 5 seconds.

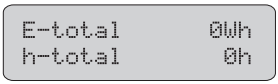
You can operate the display by tapping.

Tap once:

The background illumination switches on or the display scrolls one message further.

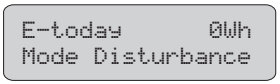
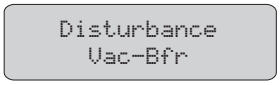
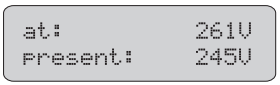
4.2 Display Messages during Operation

Upon error-free connection of the inverter to the power distribution grid, after approximately one minute, the display starts alternating between the messages shown below. Each message appears for 5 seconds, and then the cycle restarts from the beginning.

Display message	Description
	Energy generated on the current day Status message "MPP"
	Current feed-in power Voltage of the PV array
	In Sunny Mini Centrals with Reactive Power Control, the current reactive power value Qac and the displacement factor cos φ (PF) are displayed after a further 5 seconds or when you tap again.
	Energy produced so far Total number of operating hours in feed-in operation

4.3 Display Messages during a Fault

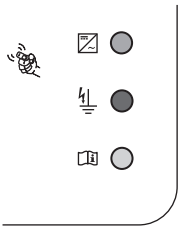
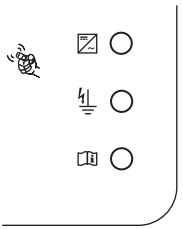
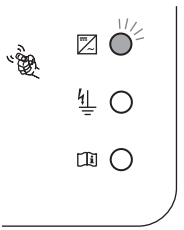
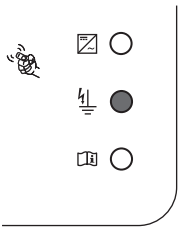
In the event of a fault, the inverter displays the status "Disturbance" and a fault message. Inform your installer.

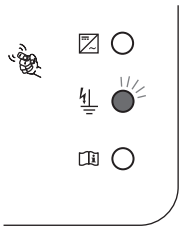
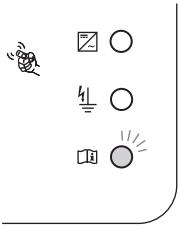
Display message	Description
	Energy generated on the current day Status message "Disturbance"
	Operating state Fault message
	Measured value at the time of the fault Current measured value (only displayed if a measured value is responsible for the fault)

4.4 DC Overvoltage

Display message	Description
	The DC input voltage is too high at the inverter. Inform your installer **immediately**!

5 LED States

Status		Description
	All LEDs are on	The inverter is initializing.
	All LEDs are off	The DC input voltage at the inverter is too low for grid feeding.
	Green LED on	The inverter is feeding in to the power distribution grid.
	Green LED flashing	The inverter is monitoring the power distribution grid and is waiting for the DC voltage to reach a defined limit so that it can begin feeding the grid. Operation interrupted. Power limitation in the inverter.
	Red LED on	A ground fault has occurred or one of the thermally monitored varistors on the DC input side is defective. Inform your installer.

Status		Description
	Red LED flashing	This fault can be caused by either of the following: At least one of the varistors is defective: display message <Check Varistor>. At least one string fuse is defective: display message <DC fuse> In both cases the inverter continues feeding into the grid. Inform your installer.
	Yellow LED on	The inverter has switched to the operating state "Dauerhafte Betriebshemmung" (Permanent Shutdown). This can have several causes. Inform your installer.
	Yellow LED flashing	The inverter displays a fault. This can have several causes. Inform your installer.

6 Visual Check and Cleaning

Check the inverter and cables for any visual signs of external damage. Contact your installer if you find any damage. Do not perform any repair work yourself.

Ask your installer to check for correct inverter operation at regular intervals.

7 Troubleshooting

7.1 Status Messages

Your inverter can be in various operating states. These are displayed as status messages, which can vary according to the method of communication.

Message	Description
Balanced	The inverter has disconnected from the power distribution grid or is limiting its power over a 10 minute average to 5 kVA. The inverter is a part of a 3 phase system with 2 further inverters and equipped with the SMA Power Balancer for the avoidance of unbalanced loads.
Derating	Overtemperature in the inverter. The inverter reduces its output to prevent overheating. To avoid unnecessary yield penalties, the design of the PV plant should be checked. Inform your installer.
Disturbance	Fault. This message appears for safety reasons and ensures that the inverter does not connect to the power distribution grid. Inform your installer.
Earthfault/Riso	Measurement of the insulation resistance of the PV plant.
Error	An error has been detected. Inform your installer.
grid mon.	Grid monitoring This display appears during the start phase, before the inverter is connected to the power distribution grid, predominantly in the morning and evening when radiation is too low and after an error.
MPP	The inverter is operating in MPP mode. MPP is the standard display message when operating under normal radiation conditions.
Mpp-Search	The inverter is calculating the MPP.
Off Grid	The inverter is in Island mode. This mode is specially designed for operation in an off-grid system.
Offset	Offset adjustment of the measurement electronics.
Stop	Operation interrupted.
V-Const	Constant voltage operation.
waiting	The conditions for connecting are not (yet) fulfilled.

7.2 Measuring Channels

If your inverter is equipped with a communication component, then numerous measuring channels and messages can be transmitted for diagnostics.

Measuring channel	Description
Balancer	Displays the current operating mode of the inverter that is set to the operating parameter "PowerBalancer".
E-total	Total amount of energy fed in
Error	Identification of the current fault/error
Event-Cnt	Number of events that have occurred
Fac	Power line frequency
h-On	Total operating hours
h-total	Total number of operating hours in feed-in operation
Iac	Power line current
Ipv	Direct current
Is*	Apparent current
Mode	Display of the current operating state.
Pac	Generated AC power
PF*	Displacement factor cos φ
Phase	The phase to which the inverter is connected.
Power On	Total number of grid connections
Qac*	Reactive power
Riso	Insulation resistance of the PV plant before entering into the power distribution grid.
Sac*	Apparent power
Serial Number	Serial number of inverter
Vac	Line voltage
Vpv	PV input voltage
Vpv-Setpoint	PV setpoint voltage

* Only for Sunny Mini Central with Reactive Power Control

8 Glossary

AC

Abbreviation for "alternating current".

DC

Abbreviation for "direct current".

Derating

A controlled reduction in performance, usually dependent on component temperatures.

Electronic Solar Switch (ESS)

The Electronic Solar Switch is part of the DC disconnection unit of the inverter. The Electronic Solar Switch must be securely inserted into the bottom of the inverter and must only be removed by an electrically skilled person.

MPP (Maximum Power Point)

Operating point of the inverter from current/voltage of the PV array. The actual position of the MPP changes constantly, depending on the level of radiation and cell temperature.

PV

Abbreviation for "photovoltaics".

Reactive Power Control

Inverters with Reactive Power Control are inverters capable of utilizing reactive power. By setting a default value for the displacement factor (cos φ), they can feed reactive power to the grid.

SMA Power Balancer

The SMA Power Balancer is a serial feature of the Sunny Mini Central. The SMA Power Balancer prevents the formation of an unbalanced load > 5 kVA (in Italy > 6 kVA) during 3-phase feed-in. To this effect, 3 Sunny Mini Centrals are connected via a control line to a 3-phase feed-in unit.

Unbalanced load

The unbalanced load is the difference between the power fed into the grid at the individual phase conductors. In Germany, this must not exceed 5 kVA. In Italy, the unbalanced load is restricted to 6 kVA.

Varistor

The varistors protect the electronics in the inverter from atmospherically coupled energy peaks, such as those that can occur when lightning strikes nearby.

9 Contact

If you have technical problems, first contact your installer. The following information is required in order to provide you with the necessary assistance:

- Inverter device type
- Serial number of inverter
- Type and number of PV modules connected
- Blink code or display message of the inverter
- Optional equipment (e.g. communication devices)

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